

Augmented Reality in Advertising and Brand Communication: An Experimental Study

O. Mauroner, L. Le, S. Best

Abstract—Digital technologies offer many opportunities in the design and implementation of brand communication and advertising. Augmented reality (AR) is an innovative technology in marketing communication that focuses on the fact that virtual interaction with a product ad offers additional value to consumers. AR enables consumers to obtain (almost) real product experiences by the way of virtual information even before the purchase of a certain product. Aim of AR applications in relation with advertising is in-depth examination of product characteristics to enhance product knowledge as well as brand knowledge. Interactive design of advertising provides observers with an intense examination of a specific advertising message and therefore leads to better brand knowledge. The elaboration likelihood model and the central route to persuasion strongly support this argumentation. Nevertheless, AR in brand communication is still in an initial stage and therefore scientific findings about the impact of AR on information processing and brand attitude are rare. The aim of this paper is to empirically investigate the potential of AR applications in combination with traditional print advertising. To that effect an experimental design with different levels of interactivity is built to measure the impact of interactivity of an ad on different variables of advertising effectiveness.

Keywords—Advertising effectiveness, augmented reality, brand communication, brand recall, interactivity.

I. INTRODUCTION

ADVERTISERS, marketers, and promoters are constantly seeking new ways to get their messages known and absorbed. Therefore, they seek to generate advertising that engages the audience, asking people to stop, spend time, and become involved with the advertising message. Digital technologies, Internet applications, and new media offer many opportunities for this purpose. The mentioned technologies are applied in the design, implementation, and control of advertising in order to improve advertising effectiveness. However, advertisers have difficulties in obtaining consumers' attention and alertness due to an increasing competitive message environment [17]. Consumers are more informed than ever but seem to be unable to select useful information; markets are characterized by information overload and an oversupply of replaceable products and services. Therefore, individual communication and brand experience take a key role in consumer communication. Augmented reality (AR) seems to be an innovative technology offering various potential to implement experience marketing and to enhance

brand communication. AR allows an enrichment of printed and digital information with interactive content [1]. Therefore, it is assumed that AR could affect advertising effectiveness.

II. AUGMENTED REALITY, INTERACTIVITY, AND VIVIDNESS IN BRAND COMMUNICATION

With the background of highly competitive consumer markets and information overload strong and distinctive brands constitute strategic resources of firms. Brands are intangible assets that enable firms to customer engagement and to accrue economic rents [2]. High levels of brand awareness and brand knowledge can reduce risks perceived by (potential) customers in the context of purchasing [3] and are therefore essential challenges in brand management. Brand knowledge describes the fact that consumers are able to build their own individual image of a brand based on recognition and recall.

AR applications represent multilateral interactive forms of communication and therefore allow an active participation in the communication process. Interactivity can be seen as central factor enhancing depth of information processing on the part of the consumer [4]. Literature shows that higher levels of perceived interactivity not always follow from higher level of de facto interactivity [5]. However, interactivity stimulates sensoric processing and enriches the mediated environment. This fact is described as vividness: "*vividness means the representational richness of a mediated environment as defined by its formal features; that is, the way in which an environment presents information to the senses*" [6].

III. THEORETICAL FRAMEWORK

Effective models to explain the influence of AR applications in communication and marketing processes do not exist so far. However, traditional theories and models can be adopted to generate a theoretical framework. The activation theory [7], the concept of customer involvement [8], as well as the elaboration likelihood model [9] and the dual mediation model [10] can be used to elaborate an adequate research model.

Activation is seen as fundamental for successful communication. The level of activation determines the alertness as well as the level of capacity and motivation. Prior studies show that consumers handle information according to their level of activation and stimulation [7]. Digital technologies and new media – such as AR – could be used in marketing and brand communication to activate people in order to focus their attention on advertisement appeal and to

O. Mauroner, professor is with the Bauhaus-University Weimar, Germany and holds the chair for innovation and creativity management, Germany (phone: +49 (0) 3643-506287; e-mail oliver.mauroner@uni-weimar.de).

L. Le and S. Best are with Bauhaus-University Weimar, Germany (e-mail: lisa.le@uni-weimar.de, mail@sabinebest.de).

improve perception and recall of the advertising message. Increasing interactivity of an ad and vividness of the media could therefore enhance the activating power of an advertising message.

Involvement is among the most investigated constructs in the field of measuring advertising effectiveness. The term involvement denominates how actively engaged an individual person is by an object or a specific activity. It describes how far consumers are willing to absorb a specific stimulus, e.g. an advertising message. Prior studies have suggested many types of involvement to explain consumers' attitude and behavior intentions toward advertisements and the brands advertised. Some researchers differentiate between enduring and situational involvement [15]. Others argue that involvement with different objects could lead to different responses and indicate three types of involvement suchlike involvement with the product, the advertisement, and the purchase situation [16]. In the present study the focus is on two types of involvement, explicitly product category involvement as well as media involvement. The former type is relatively enduring, whereas the latter is relatively situational [17]. There is empirical evidence, showing that situational involvement is a determinant factor in advertising context [11], [12].

The Elaboration Likelihood Model (ELM) of persuasion is a dual process theory describing how people process information. The model explains the formation and transformation of attitudes according to a person's involvement and motivation [9]. The ELM claims that there are two ways to persuasion: the central path and the peripheral path. If a person is motivated and able to think about the message and if there are convincing arguments to use, then the central route to persuasion should be used. If a person is unlikely to elaborate the message, or if the available arguments are weak, then the peripheral route to persuasion is most appropriately used [9], [18]. In other words, if the receiver of a message cares about the topic and has access to the message with a minimum of distraction, then that person will elaborate on the message. Affective stimuli are generally allocated to the peripheral route in the ELM. This strict separation seems somewhat out-of-date in the face of new and interactive media. Interactive technologies – such as AR – try to create product experiences, which are to some extent emotional and cannot be assigned clearly to the peripheral persuasion route.

The ELM has been expanded by the attitude-toward-the-ad, which is defined as predisposition to respond in a favorable or an unfavorable manner to a particular advertising stimulus during a certain exposure occasion [13]. Thereby the attitude-toward-the-ad is seen as a situational bound construct since it represents an affective reaction to the ad generated at the time of exposure. It is estimated to have its maximum impact on other response variables (e.g. brand recall) at the point of exposure or immediately following that point [13]. Therefore, it is fundamental to understand the main determinants of the attitude-toward-the-ad and to realize how different levels of interactivity of advertising – AR – are influencing these constructs. Main determinants are [13]

- the usefulness of the ad,
- the novelty of the ad,
- and the ad credibility.

The ELM as well as the extension by the attitude-towards-the-ad reveals that the involvement and the level of cognitive processing by the consumers clearly affect the power of an advertising message. Interactivity of an ad therefore can have an impact on the message processing that follows. Consequently, existent advertising theories and models are useful starting points to explain the effectiveness of interactive brand communication [14]. As a result, a research model can be composed for the present study (Fig. 1), which mainly consists of:

- the interactivity of the ad (AR),
- the determinants of the attitude towards the ad (usefulness, novelty, and credibility of the ad).

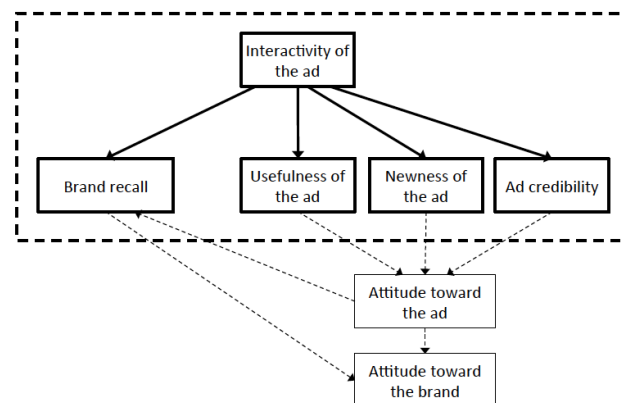


Fig. 1 Research model of the present study

IV. METHODOLOGY

A. Sample and Procedure

One hundred and twenty (120) magazine readers (age between 22 and 57 years; average age of 31.1 years) from Germany participated in the study. Of these, 63 were female and 57 were male readers.

The test persons were recruited in a coffeehouse in the city of Jena, Germany. The experiment took place in a separate guest room in order to control the lab situation and to reduce irritation. In a first step all participants were randomly allocated to one of the three treatment groups, as shown in Fig. 2. Participants of the first group were considered to observe an ad without any interactive AR elements while the other two groups included the same ad with different levels of interactivity. To activate AR functionalities, the test persons were pleased to use a small tablet computer with a pre-installed app.

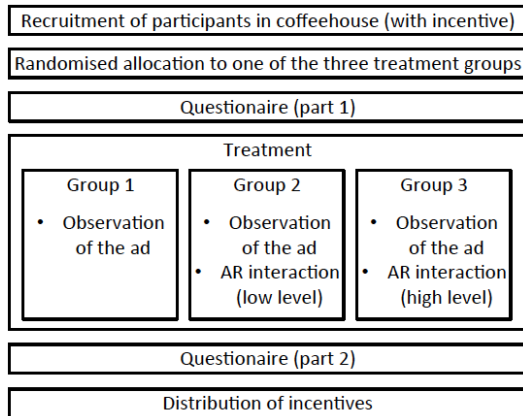


Fig. 2 Experimental design and procedure

B. Measures and Experimental Design

Aim of the experimental study is to analyse the impact of AR interaction (interactivity of the ad) on different advertising measures. Therefore, three treatment groups represent the experimental stimulus (interactivity of the ad):

- Treatment group 1: product ad with no QR-symbol and without any kind of AR interaction (no interactivity).
- Treatment group 2: product ad with QR-symbol and an embedded advertising spot (low interactivity).
- Treatment group 3: product ad with QR-symbol offering additional information and an embedded product configurator (high interactivity).

The measures for the dependent variables as well as for the moderating variables came from previous literature. '*Brand recall*' was measured using participants' cognitive responses. It was coded '0' in case of no recall, it was coded '1' in case of supported recognition (brand recognition) and it was coded '2' in case of an unsupported brand recall. '*Ad credibility*' (4 items) was rated on semantic differential on a seven-point scale. The manipulation was controlled by a check-variable referring to the '*perceived interactivity*' of the ad (5 items). Table I shows the operationalization of the variables in accordance to prior studies. Items were measured with seven point Likert scales.

TABLE I
OPERATIONALIZATION OF THE VARIABLES

Variable	Number of items	Prior studies
Attitude toward the brand	5	Hatsak & Olsen 1989 [19]
Attitude toward the ad	4	Lutz, MacKenzie & Blech 1986 [10]
Product category involvement	8	Beatty & Talpade 1994 [20]; Coulter, Price & Feick 2003 [21]
Media involvement	8	Coulter, Price & Feick 2003 [21]
Media experience	4	Li, Daugherty & Biocca 2002 [22]
Attitude towards advertising in general	3	MacKenzie & Lutz 1989 [23]
Usefulness of the ad	4	Soh, Reid & King 2009 [24]
Novelty of the ad	5	Sheinin, Varky & Ashley 2011 [25]
Ad credibility	3	MacKenzie & Lutz 1989 [23]; Williams & Dorlet 2005 [26]

V. RESULTS

To measure scale reliability Cronbach's Alpha were calculated. For all of the constructs the Cronbach's Alphas reached a value between 0.84 and 0.98. This confirms the reliability of the scales. Just the '*attitude toward the brand*' primarily showed a value of 0.67 and by eliminating one item could be improved to 0.89. Table II demonstrates the results of the reliability check.

The experimental design contains a group-wise treatment of the test persons. To analyse the effect of the manipulation a check variable is collected representing the '*perceived interactivity of the ad*' (5 items). The results of the manipulation check showed significant differences (1% level) of the perceived interactivity regarding the three treatment groups. A post-hoc-test was performed to analyse differences between the single treatment groups. The control group (group 1) showed the lowest (1.62) mean value, while the other two groups clearly showed higher mean values (group 2: 5.55; group 3: 6.60). Therefore, the manipulation can be considered as successful.

TABLE II
RELIABILITY CHECK WITH CRONBACH'S ALPHA

Variable	Cronbach's Alpha
Attitude toward the brand	0.89
Attitude toward the ad	0.95
Product category involvement	0.97
Media involvement	0.98
Attitude towards advertising in general	0.86
Usefulness of the ad	0.95
Novelty of the ad	0.98
Ad credibility	0.84
Perceived Interactivity of the ad	0.98

The preliminary results show that the '*interactivity of the ad*' has a significant influence on the '*brand recall*'. Thereby the variable representing the '*attitude towards advertising in general*' has been implicated as covariate. By doing so the influence of the covariate on the dependent variable has been isolated. The results of an analysis of covariance (ANCOVA) showed significant results on a high level ($p < 0.005$). An additional post-hoc-test confirmed the direction of the effect showing that a higher level of '*interactivity of the ad*' leads to better '*brand recall*'.

Main results of the study also show that '*interactivity of the ad*' has an impact on the three determinants of '*attitude towards the ad*', namely '*novelty of the ad*', '*ad credibility*', and '*usefulness of the ad*' (Table III). A multivariate analysis of variance (MANOVA) showed significant results. A subsequent post-hoc-test confirmed the results by showing anticipated effect directions on a 5% significance level. Therefore, the level of '*interactivity of the ad*' can be seen as an influencing factor on the '*attitude towards the ad*' and therefore affects the ad processing.

TABLE III
RESULTS OF THE MANOVA

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Inter-activity of the ad	Credibility of the ad	127.813	2	63.907	140.328	0.000	0.706
	Novelty of the ad	474.932	2	237.466	787.797	0.000	0.931
	Usefulness of the ad	284.493	2	142.246	358.499	0.000	0.860

VI. DISCUSSION, LIMITATIONS, AND FUTURE RESEARCH

The study so far shows that interactivity has a significant influence on brand recall and therefore interactive examination with an ad leads to a better and more intense cognitive processing of the brand message. Brand recall depends heavily on relevant consumer experiences, which usually can be achieved after the purchase. AR combines printed ads with virtual reality and has the potential to provide the consumer with product relevant experiences. AR can be seen as a substitute for real life product experiences. Furthermore, the results show that the interactivity also has significant influence on the determinants of attitude-towards-the-ad. Interactivity in some cases may be able to enhance the way in which consumers consider an advertising: more useful, novel, and credible.

Only print magazine ads were analysed in this study. The effect of advertising attitudes on banner ads and television commercials may be rather different. Related to that, further research could focus on the integration of AR in other forms of advertising under low and high involvement conditions and when advertising is predominantly rational or emotional. Further, demographic differences especially age and gender differences need to be more fully studied. Although no systematic differences were found for sex in this study and therefore not discussed, they need to be tested more precisely. Nevertheless, the results of this study show that AR may influence future advertising. The practical implementation of AR depends on both technological improvements as well as consumer acceptance. Further research should therefore focus on usability, acceptability and consumer habits.

REFERENCES

- [1] P. Milgram, F. Kishino, *A taxonomy of mixed reality visual displays*, IEICE (Institute of Electronics, Information and Communication Engineers) Transactions on Information and Systems, Special issue on Networked Reality, Dec. 1994.
- [2] K. Conner, *A historical comparison of resource-based theory and five schools of thought within industrial organisation economics: Do we have a new theory of the firm?* Journal of Management, 1991, 17, pp. 121-154.
- [3] O. Moisesescu, P.E. Berteau, *The Impact of Brand Awareness, Brand Knowledge and Price Positioning on Perceived Risks Associated to Buying Online from Travel Agencies*, Romanian Journal of Marketing, 2013, 3, pp. 13-22.
- [4] Y. Liu, L. J. Shrum, *What is Interactivity and Is It Always Such a Good Thing?* Journal of Advertising, 2002, 31,4, pp. 53-64.
- [5] L. Se-Jin, L. Wei-Na, K. Hyojin, P. A. Stout, *A Comparison of Objective Characteristics and User Perception of Web Sites*, Journal of Interactive Advertising, 2004, 4, 2, pp.61-75.
- [6] J. Steuer, *Defining Virtual Reality. Dimensions Determining Telepresence*, Journal of Communication, 1992, 42, 4, pp. 73-93.
- [7] P. S. Raju, *Theories of Exploratory Behaviour: Review and consumer Research Implications*, in: J. N. Sheth (Ed.), Research in Marketing: A Research Annual, 1981, Greenwich: Jai Press, pp. 223-249.
- [8] V. Trommsdorff, *Konsumentenverhalten*, 2008, Stuttgart, Germany: Kohlhammer.
- [9] R. E. Petty, L.T. Cacioppo, *The Elaboration Likelyhood Model of Persuasion*, in: L. Berkowitz (Ed.), Advances in Experimental Social Psychology, 1986, New York, USA: Academic Press, pp. 123-205.
- [10] R. J. Lutz, S. B. MacKenzie, G. E. Blech, *Attitude Toward the Ad as a Mediator of Advertising Effectiveness: Determinants and Consequences*, in: R. P. Bagozzi, A. M. Tybout (Eds.), Advances in Consumer Research, Ann Arbor: Ass. For Consumer Research, 1983, pp. 532-539.
- [11] G. Jeck-Schlottmann, *Anzeigenbetrachtung bei geringem Involvement*, Marketing ZFP, 1987, 10, s, pp. 33-43.
- [12] H. Wettig, *Plakat Werbung. Die Werbung vor dem Anschlag testen*, Marketing Journal, 1992, 25, 2, pp. 460-467.
- [13] R. J. Lutz, *Affective and Cognitive Antecedents of Attitude towards the Ad: A Conceptual Framework*, in: L. F. Alwitt (ed.), Psychological Processes and Advertising Effects: Theory, Research and Applications, 1985, Hillsdale, pp. 45-63.
- [14] F. R. Esch, G. Kiss, *Wirkung interaktiver Markenauftritte im Internet*, Marketing Zeitschrift für Forschung und Praxis, 2006, 18, 2, pp. 99-115.
- [15] M. J. Houston, M. L. Rothschild, *Conceptual and Methodological Perspectives on Involvement*, in: C. J. Subbash (ed.), Research Frontiers in Marketing: Dialogues and Directions, 1978, Chicago: American Marketing Association, pp. 184-187.
- [16] J. L. Zaichkowsky, *Research Notes: The Personal Involvement Inventory: Reduction, Revision, and Application to Advertising*, Journal of Advertising, 1994, 23 (4), pp. 59-70.
- [17] S. Kim, E. Haley, G.-Y. Koo, *Comparison of the paths from consumer involvement types to ad responses between corporate and product advertising*, Journal of Advertising, 2009, 38, 3, pp. 67-80.
- [18] R. E. Petty, J. T. Cacioppo, *Communication and persuasion: Central and peripheral routes to attitude change*, 1986, New York: Springer-Verlag.
- [19] M. Hastak, J. C. Olsen, *Assessing the Role of Brand-Related Cognitive Responses as Mediators of Communication effects on Cognitive Structure*, Journal of Consumer Research, 1989, March, pp. 444-456.
- [20] D. R. Beatty, S. Talpade, *Adolescent Influence in Family Decision Making: A Replication with Extension*, Journal of Consumer Research, 1994, 21, 2, pp. 332-341.
- [21] R. A. Coulter, L. L. Price, L. Feick, *Rethinking the Origins of Involvement and Brand Commitment: Insights from Postsocialist Central Europe*, Journal of Consumer Research, 2003, September, pp. 15-169.
- [22] H. Li, T. Daugherty, F. Boccia, *Impact of 3-D Advertising on Product Knowledge, Brand Attitude, and Purchase Intention: The Mediating Role of Presence*, Journal of Advertising, 2002, 31, 3, pp. 43-57.
- [23] S. B. MacKenzie, R. J. Lutz, *An Empirical Examination of the Structural Antecedents of Attitude Toward the Ad in an Advertising Pretesting Context*, Journal of Marketing Research, 1989, 53, 4, pp. 48-65.
- [24] H. Soh, L. N. Reid, K. W. King, *Measuring Trust in Advertising: Development Validation of the ADTRUST Scale*, Journal of Advertising, 2009, 38, 2, pp. 83-103.
- [25] D. A. Sheinin, S. Varky, C. Ashley, *The Differential Effect of Ad Novelty and Message Usefulness on Brand Judgments*, Journal of Advertising, 2011, 40, 2, pp. 5-17.
- [26] P. Williams, A. Dorlet, *Age-Related Differences in Responses to Emotional Advertisements*, Journal of Consumer Research, 2005, 32, 2, pp. 343-354.